acting as an efficient scour in its descent. Every change in a river whose channel is in a state of regimen, produces a change in the relative velocity, which, again, is attended with a loss of power. It is well known that a series of alternate expansions and contractions of the channel of any running stream of water materially retards the velocity and quantity of discharge. If a uniform channel be in any way expanded in parts, the expense of water will be diminished; those parts where the channel is expanded imparting a much greater degree of friction, eddies are produced, and the hydraulic mean depth is also lowered, which together diminishes the velocity, and consequently the discharge. And a negative quantity of discharge will also be the result when a uniform channel is contracted at parts. For whatever may be the form of the section of any contraction or obstruction which is presented to the run of the tide, it more or less checks the velocity and free flow of the currents, raises the height, and causes reflected motions and eddies, which produce deposits and accumulations. The quantity of water discharged through any section of a stream running in train along a regular and uniform channel would be equal in the same time, because the velocity of the stream, from the equality of friction and hydraulic mean depth would be uniform, and the declivity of surface would be equal throughout its length. But immediately that the section is narrowed at any part and continued for some distance, the previous uniform velocity is destroyed, the height of the stream will be somewhat augmented behind the point of contraction, and the check thus produced will diminish the velocity backwards. The increased velocity at the contracted part does not make up for the diminution of velocity behind, as might be supposed, for under the circumstances, the same quantity of water passes through the compressed section, as through the larger. It would appear, therefore, that a retardation of both the velocity and quantity of water would be the result of a contraction, independent of the abstraction beyond, for as the velocity backwards is diminished, the velocity, multiplied by the section, gives the discharge through that section.

When a dam or sluice is placed across a stream running in train upon a channel which the action of the water has adapted to it, it is very remarkable to witness the diminished effect that is produced in the velocity of the upstream. The declivity and form of the channel which accelerates the motion of the water is destroyed, and the height of the stream is immediately augmented until it adapts itself under the circumstances to the discharge. When the channel of a stream or river is contracted, an immediate augmentation of the height is produced, which is quickly followed by an increased velocity. Both the flux and reflux of the tides between the parts to be embanked, will receive a permanent augmentation of velocity, in consequence of the contraction of the channel and the uniformity of its width; and the velocities of the stream will vary in inverse proportion to the areas of the transverse sections, increasing where the channel is contracted, and diminishing where it expands. For the quantity of water discharged through a given area, A, with a given mean velocity, V, is evidently proportional to the area and velocity conjointly, or to A × V; and as the area remains constant, the velocity also remains the same; therefore, when the area, A, varies, the quantity of water being the same, the mean velocity, V, also varies inversely as the area; and if a given quantity of water pass through any other area, a, with a given mean velocity, v, $a \times v$ must also vary in the same time; consequently, $A \times V = a \times v$, and $A : a :: v : V$. *Ex.* let A = 17,000 sup. ft.; a = 21,000 sup. ft.; v = 4·583 ft. per sec.; then V = 5·6014 ft. per sec. For as 17,000 : 21,000 :: 4·583 : 5·6614; and ∴ (17,000 × 5·6614) = (21,000 × 4·583) = 96,243 cubic ft. per sec. = the discharge. So that the same quantity of water passes through each section in the same time; in fact, this must always take place, in order to keep up a regular discharge. Now the depth of a running stream is dependant upon the declivity of the channel and the form and width of the transverse section. The consequence of allowing the tidal waters of a river to expand over extensive lateral tracts of land adjacent to the main channel, is to produce in some degree a depression of its depth, and both the flux and reflux will, from this cause, be of a diminished velocity. But immediately that the spaces of those lateral tracts of land are abstracted, and by embankments the transverse section of a river is narrowed, the waters will flow and reflow with an augmented velocity throughout the whole of the confined channel, but more especially at the surface in the middle of the greatest run of the stream; and at the same time the stream will increase in height. An enlargement of the transverse section, therefore, as at present, produces a diminution of depth and velocity, and as the section increases, the amount of water is augmented in much greater proportion; and conversely by contracting the width of the channel at that part an increased depth and velocity will be imparted to the stream, and a somewhat less quantity of water will be forced up by the tide. This must have the effect of placing those situations on the banks of the Thames in jeopardy which have hitherto been barely out of its influence, and a solid embankment of the river Thames would have a considerable tendency towards producing this effect. But the excellent plan proposed by Mr. Page can only cause an increased height in a very slight degree, providing the tide be allowed to flow regularly in and out of the docks; as the cubical contents of the wall itself, and the spaces proposed to be filled up in front of Whitehall and the Temple-gardens, would be the only abstraction of water-space, and this abstraction is to be compensated for by dredging above low water mark, bringing the low water line to the base of the terrace.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

An ordinary meeting was held on Monday evening last (the 10th), Mr. H. E. Kendall in the chair, when Mr. Charles Freeman was elected a fellow, and Mr. William Beck, Mr. Thomas Hayter Lewis, and Mr. Edwin Nash, were elected associates. Amongst the donations was a curious edition (from Mr. Webb), of Cæsar's Commentaries, translated by Palladio, and published at Venice in 1518.

Mr. R. W. Billings then read a paper on the carving machine patented by Mr. Samuel Pratt, and exhibited a number of specimens executed by it. We shall notice this very valuable invention in the ensuing week.

The honorary secretary announced that the medals of the Institute would be awarded next year to the authors of the best essays on the following subjects:—

1. On the adaptation and modification of the orders of the Greeks by the Romans and moderns.

2. On the history and manufacture of bricks.

And that the Soane medallion would be awarded to the best design for a royal chapel, with seats for five hundred persons, inclusive of the suite, attendants, and choir; the building to be detached, and in a classic Roman, or Italian style. The drawings of the elevations and two sections to be to a scale of one-quarter of an inch to the foot; the plans and perspective view to one-eighth of an inch to the foot, and tinted with India ink or sepia only.

We are anxious to draw attention to these premiums, and express a hope that some of our readers may be induced to enter the lists and carry off the prize. The competition is not confined to members of the Institute.

Das Mauriche Bad.—A very extensive structure in the Moorish style has recently been erected at Kaunstadt, in Wirtemburg. It consists of baths, picture-galleries, rooms for balls and assemblies, and spacious conservatories furnished with the choicest plants, and disposed in the most tasteful manner. It is constructed of stone of two different tints laid in alternate courses, and all the architectural members and ornamental details are said to be faithfully rendered from the finest specimens of Arabian architecture in Spain. One conspicuous feature in the design is a copper dome richly gilt; and the octagon conservatories, whose sides are composed of lattice-work filled in with glass, have also gilded domes. Its name is not yet determined upon, so at present it is known only by that which it has obtained from the public of "Das Mauriche Bad," or the Moorish bath. Zanth is the architect.

INSTITUTION OF CIVIL ENGINEERS.

March 4.—Sir John Rennie, President in the chair.

The paper read was "A description of the Great Britain steam-ship, with an account of the trial voyages," by Mr. T. R. Guppy, Assoc. under whose superintendence the vessel and engines were constructed. The paper first gave an account of the origin of the Great Western Steam-ship Company, by a few of the proprietors of the Great Western Railway, who thought that when their railway was completed, Bristol would become the natural port for a direct line of communication with New York; hence the building of the Great Western steamer, which succeeded beyond the expectation of the proprietors, with the single exception, that, like many other steamers, the machinery and fuel occupied so great a space, comparatively with that devoted to passengers and goods, as to operate prejudicially in a pecuniary point of view. The company then projected a second ship, and after much consideration, decided upon building it of iron, with peculiar direct acting engines, and in consequence of the apparent success of the experimental "Archimedes," they determined upon using the screw propeller. The details of the construction with the dimensions were then given; of the latter, as they have so repeatedly been published, it will suffice to mention only a few;—the length of keel, 289 feet; length aloft, 322 feet; main breadth, 50 feet 6 inches; depth of hold, 32 feet 6 inches, tonnage, 3,444 tons. The weight of iron used in the hull is 1,040 tons; the weight of woodwork in decks, &c., is 370 tons; weight of the engines and boilers without water is 520 tons; the total weight is therefore 1930 tons. She will take 1,000 tons of coal, and 1,000 tons of measurement goods, at a draft of 17 feet of water forward, and 17 feet 6 inches aft.

The engines employed to drive this screw consist of four cylinders, each 88 inches in diameter, with 6 feet stroke, working with steam at 4½ lbs. pressure, and cutting it off at ⅛th the length of the stroke. The connecting rods act directly in pairs upon crank pins at either end of the main shaft, 17 feet long by 28 inches in diameter. Upon the main shaft is a toothed drum 16 feet diameter, around which work four pitched chains, encircling also a lower drum 6 feet in diameter upon the propeller shaft. The chains work quietly and smoothly, and when the engines are making eighteen revolutions per minute, the speed being nearly 2·95 to 1, the screw makes about fifty-three revolutions per minute. A considerable portion of this shafting was 30 inches diameter, hollow, and formed of two courses of plates ⅞ inch thick rivetted together.

The account of the trial trips in the Bristol Channel, and the voyage from Bristol to London, abounded in curious facts. It appeared that with the engines making 18¼ revolutions, the speed of the vessel would be 11½ knots, and the slip of the screw 13 per cent.: even during the voyage round, with a heavy gale dead against her, she made upwards of 9¼ knots. The ship behaved remarkably well, steered well, and although disadvantageously loaded, with no weight in her bottom, she rolled easily. In the heaviest weather the engines worked uniformly, and never made those variations in speed which are observed in steam-boats when the paddle-wheels are alternately plunged deeply, and then nearly out of the water.

Railway in India.—A company has been formed to construct a railway to connect Bombay with the mainland, and ultimately with the city of Poonah, and the Deccan. Government has expressed its willingness to allow a free passage through its lands, and has recommended an Act of incorporation. The leading native landholders have also come forward to declare their concurrence to grant a free passage through their lands. There are no remarkable difficulties for the engineering department between the fort of Bombay and Tamah, and the traffic in goods, produce, and passengers is very great. Of the advantages of the railway there is not the smallest doubt; the direct trade from Bombay into the interior has no other line for a road.

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